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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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09/870,703

06/01/2001

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13690

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11/19/2004

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EXAMINER

DAVIS, CYNTHIA L

ART UNIT

PAPER NUMBER

2665

DATE MAILED: 11/19/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

<b>Office Action Summary</b>	<b>Application No.</b> 09/870,703	<b>Applicant(s)</b> NORMAN ET AL. <span style="float: right;">OK</span>	
	<b>Examiner</b> Cynthia L Davis	<b>Art Unit</b> 2665	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-46 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-46 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 01 June 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                        | 4) <input type="checkbox"/> Interview Summary (PTO-413)                     |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)               | Paper No(s)/Mail Date. ____.  |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date <u>2,3,4,7,12</u> .  | 6) <input type="checkbox"/> Other: ____.                                    |

## DETAILED ACTION

### ***Claim Rejections - 35 USC § 102***

(a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

1. Claims 1-6, 28-37, and 42-45 are rejected under 35 U.S.C. 102(a) as being anticipated by McCrosky.

Regarding claim 1, a switch fabric implemented on a chip is disclosed in column 10, lines 47-48 and column 14, lines 38-39 of McCrosky. An array of cells is disclosed in column 10, lines 13-14 (the SCS routers are the cells, the hypercube may be viewed as an array). An I/O interface in communication with said array of cells permitting exchange of data packets between said array of cells and components external to said array of cells is disclosed in column 8, lines 4-9. Each cell communicating with at least one other cell of said array permitting exchange of data packets between the cells of said array is disclosed in column 9, lines 11-12. Each cell including a memory for holding a plurality of data packets for transmission to other cells of said array is disclosed in figure 3, element 303. Each data packet of the plurality of data packets having a characteristic element represented by a parameter, the parameter allowing to distinguish one data packet from another data packet in the plurality of data packets is disclosed in column 8, lines 65-66 (the parameter is priority). A control entity operative to select at least one data packet from the plurality of data packets at least in part on a basis of the parameter, and transmit the selected data packet to another cell of said array of cells is disclosed in figure 3, elements 301, 305, and 307 (these elements control the operation of the SCS router).

Regarding claim 2, the parameter being priority, and the characteristic element being a priority level is disclosed in column 8, lines 65-66.

Regarding claim 3, each cell including a transmitter in communication with said I/O interface and in communication with every other cell of said array, said transmitter operative to process a data packet received from said I/O interface to determining a destination of the data packet and forward the data packet to at least one cell of said array selected on a basis of the determined destination is disclosed in column 9, lines 11-12 and 28-35 (the nodes must have transmitters, as they are exchanging packets; the exchange is based on priority). A plurality of receivers associated with respective cells from said array, each receiver being in communication with a respective cell allowing the respective cell to forward data packets to the receiver is disclosed in column 9, lines 11-12 (the nodes must have receivers, as they are exchanging packets). The receivers being in communication with the I/O interface for releasing data packets to said I/O interface is disclosed in column 8, lines 4-9 (the nodes can receive and transmit packets from and to the outside world, so each node's receiver must be in communication with the I/O interface).

Regarding claim 4, the array of cells including a plurality of data channels, each data channel being associated with a given cell, the data channel associated with said given cell connecting the transmitter of said given cell to receivers in cells other than said given cell and associated with said given cell is disclosed in column 9, lines 11-12 (the nodes have data channels which connect their transmitters to the receivers of other nodes so that the nodes can exchange cells).

Regarding claim 5, the data channel associated with said given cell connecting the transmitter of said given cell to a receiver in every cell of said array of cells and associated with said given cell is disclosed in column 9, lines 11-12 (the data channel connects the given node to every node that is associated with it on the edges of the hypercube).

Regarding claim 6, the plurality of data channels being independent from one another, wherein transmission of a data packet over one data channel is made independently of a transmission of a data packet over another data channel is disclosed in column 9, lines 8-9, and 10-11.

Regarding claim 28, the memory being a first memory, the switch fabric including a second memory wherein said second memory includes a plurality of sectors associated with respective receivers of said plurality of receivers, said sectors capable of storing data packets forwarded to said receivers by cells of said array is disclosed in McCrosky, figure 2, element 600, and column 11, lines 1-2.

Regarding claim 29, each receiver of said plurality of receivers communicating with said I/O interface is disclosed in McCrosky, column 10, lines 6-8 (the packets are injected from the outside via an interface into all of the SCS routers, or nodes).

Regarding claim 30, the control entity being a first control entity, the switch fabric including a second control entity to regulate a release of data packets from said sectors to said I/O interface is disclosed in McCrosky, figure 17, which show the egress function of the SSAC. The SSAC regulates the flow of packets between the SCS router (figure 2, element 300) and the I/O interface (figure 2, element 205).

Regarding claim 31, the second control entity including a plurality of queue controllers associated with respective elements of said second memory is disclosed in McCrosky, figure 17, element 1707 (the queues must have controllers to regulate the egress of packets from the SSAC).

Regarding claim 32, a data packet received by a receiver of said plurality of receivers being characterized by a priority level selected in a group of priority levels, each sector of said second memory being divided into subdivisions each subdivision capable of storing at least one data packet, each subdivision being associated with a given priority level of said group of priority levels is disclosed in McCrosky, column 23, lines 20-25 (a forward queue existing for each for each cell priority level would entail dividing the memory in the switching fabric up into sectors associated with the various priority levels).

Regarding claim 33, the second control entity including an arbiter in communication with said queue controllers, each queue controller operative to transmit a control signal to the arbiter of said second control entity for each data packet held in the sector associated with the queue controller to request release of the data packet to said I/O interface is disclosed in McCrosky, figure 17, element 1707, and column 23, lines 58-60 (the output queue process acts as the arbiter).

Regarding claim 34, each control signal conveying the priority level of the data packet associated with the control signal is disclosed in McCrosky, column 23, lines 58-60 (the priority of the cell must be conveyed, so that the output queue process knows which queue is highest priority).

Regarding claim 35, the arbiter selecting a data packet for release to said I/O interface among the data packets corresponding to the control signals transmitted to the arbiter of said second control entity on the basis of the levels of priority of the data packets corresponding to the control signals is disclosed in McCrosky, column 23, lines 58-60 (the priority of the cell must be conveyed, so that the output queue process knows which queue is highest priority).

Regarding claim 36, the control entity being operative to alter the parameters associated with respective data packets of the plurality of data packets is disclosed in McCrosky, column 9, lines 36-37 (the system is capable of boosting priority levels of cells).

Regarding claim 37, the control entity being operative to alter the priority levels associated with respective data packets of said plurality of data packets is disclosed in column 9, lines 36-37 (the system is capable of boosting priority levels of cells).

Regarding claim 42, each cell including a CPU connected to the transmitter, said transmitter being further operative to process a data packet received from said CPU to determine a destination of the data packet and forward the data packet to at least one cell of said array selected on the basis of the determined destination is disclosed in figure 1, element 101, and column 10, lines 35-41 (the CPU performs the operations that allow cells to move through the switching fabric).

Regarding claim 43, each cell including a CPU connected to the transmitter, said transmitter being further operative to process a data packet received from said CPU to determine a destination of the data packet and forward the data packet to at least one

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cell of said array selected on the basis of the determined destination, wherein data packets received by the transmitter in a given cell from the I/O interface and from the CPU in said given cell share the data channel associated with said given cell is disclosed in figure 1, element 101, and column 10, lines 35-41 (the CPU performs the operations that allow cells to move through the switching fabric).

Regarding claim 44, each cell further including a CPU connected to the plurality of receivers, said receivers being further operative to determine whether data packets are to be released to the I/O interface or to the CPU and release said data packets accordingly is disclosed in figure 1, element 101, and column 14, lines 56-57.

Regarding claim 45, each data packet comprising a field indicative of whether the data packet is destined for the CPU and wherein said receivers are operative to determine whether data packets are to be released to the I/O interface or to the CPU on the basis of said field is disclosed in McCrosky in table 1, in column 7 (OAM cells, or control cells, are indicated by a setting of the PTI field).

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. Claims 7-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over McCrosky in view of Boggess.



Regarding claim 7, each data channel performing a parallel data transfer is missing from McCrosky. However, Boggess discloses in column 1, lines 46-50, transferring data in parallel to increase the rate of data transfer. It would have been obvious to one skilled in the art at the time of the invention to transfer the data in parallel. The motivation would be to speed up the data transfer.

Regarding claim 8, the memory and control entity forming part of said transmitter is disclosed in McCrosky, figure 3, elements 303 (the memory), 301, 305, and 307 (the control entity); these elements contribute to the transmitting process and hence are part of the transmitter.

Regarding claim 9, the memory including a plurality of segments, each segment being associated with a receiver in a cell of said array to which the transmitter of said given cell is capable of forwarding a data packet via the data channel is disclosed in McCrosky, column 13, lines 3-4 (each column in the memory is associated with an outgoing link).

Regarding claim 10, the control entity being operative to process a data packet forwarded from said I/O interface to determine a cell of said array to which the data packet is destined and identify on a basis of the determined cell a segment of said memory into which the packet is to be loaded is disclosed in McCrosky, figure 3, element 307, and column 13, lines 31-40 (the column selection logic decides which queue a packet is written into).

Regarding claim 11, the control entity including a plurality of queue controllers associated with respective segments of said memory is disclosed in McCrosky, figure 3,

element 307, and column 13, lines 31-40 (the column selection logic determines available links, or segments, in the memory).

3. Claims 12-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over McCrosky in view of Boggess in further view of Norton.

Regarding claim 12, the memory implementing a plurality of registers, each register being associated with a queue controller and being suitable for holding data representative of a degree of occupancy of a segment of said memory associated with the queue controller is not specifically disclosed in McCrosky, and is missing from Boggess. However, McCrosky does disclose in column 13, lines 36-37, that the column assignment logic knows which links have been allocated in the previous assignment cycle, i.e., the occupancy of the links, so it must be stored somewhere. Norton further discloses in column 5, lines 20-22, storing configuration data of cell processing units in a switch in registers. It would have been obvious to one skilled in the art at the time of the invention to store the degree of occupancy of each segment of memory in registers. The motivation would be to have a convenient type of hardware in which to store the occupancy data.

Regarding claim 13, each segment of said memory being partitioned in slots, each slot capable of storing at least one data packets, each slot being associated with a given priority level of said group of priority levels is disclosed in McCrosky, figure 3, element 303, column 13, line 3 (the memory is divided up into rows and columns, which, when they come together, form slots), and column 13, lines 19-21 (the row assignment is based on priority levels).

Regarding claim 14, the registers of said memory associated with each queue controller store data indicative of a degree of occupancy of the slots of said segment associated with the queue controller, for each priority level of the group of priority levels is disclosed at column 13, lines 36-37, and column 9, line 28 (the degree of occupancy for each slot is stored, so that processing can be done for each cell priority) of McCrosky.

Regarding claim 15, the transmitter of said given cell communicating with each receiver associated with said given cell to assess a degree of occupancy of each receiver associated with said given cell is disclosed in column 9, lines 28-35 (the actions taken with each cell depend on the occupancy of the associated receivers, so the transmitters must have that information) of McCrosky.

4. Claims 16-17 are rejected under 35 U.S.C. 103(a) as being unpatentable over McCrosky in view of Boggess in further view of Black.

Regarding claim 16, the transmitter of said given cell communicating with each receiver associated with said given cell to assess the degree of occupancy of each receiver associated with said given cell is disclosed in column 9, lines 28-35 (the actions taken with each cell depend on the occupancy of the associated receivers, so the transmitters must have that information). Communicating over a back channel is missing from McCrosky. However, Black discloses in column 10, lines 40-45 using a back channel to communicate information between nodes that only need to send information in one direction. It would have been obvious to one skilled in the art at the time of the invention to use a back channel to communicate occupancy information from

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the associated receivers to the transmitter. The motivation would be to take that information out of the regular flow of traffic, freeing up space in the main data channel.

Regarding claim 17, having a plurality of back channels, there being a dedicated back channel between the transmitter of said given cell and each receiver associated with said given cell is missing from McCrosky. The back channel disclosed in Black at column 10, lines 40-45 only runs between two nodes. Having a plurality of back channels, one from the transmitter to each of its associated receivers, would have been obvious to one skilled in the art at the time of the invention. The motivation would be to have a way to communicate occupancy information between each associated receiver and the transmitter.

5. Claims 18-27 and 46 are rejected under 35 U.S.C. 103(a) as being unpatentable over McCrosky in view of Boggess and Black, in further view of Corbalis.

Regarding claim 18, each back channel transferring data serially is missing from McCrosky and Black. However, Corbalis discloses in column 5, line 11-12, multiple serial data transfer links in a switching circuit going from one communication module to multiple communication modules, similar to having multiple serial back channels going from a plurality of receivers to a transmitter. It would have been obvious to one skilled in the art at the time of the invention to transfer the occupancy data serially, because there is only one back channel between the each receiver and the transmitter, and there are no other channels to break up the information in order to transfer it in a parallel manner.

Regarding claim 19, the memory including an area for storing data indicative of the degree of occupancy of each receiver associated with said given cell is disclosed in McCrosky, column 9, lines 28-35 (the actions taken with each cell depend on the occupancy of the associated receivers, so the transmitters must have that information stored in a memory or some type).

Regarding claim 20, the control entity being operative to process the data indicative of the degree of occupancy of each receiver associated with said given cell to determine which data packet stored in said memory is suitable for transmission to a receiver is disclosed in is disclosed in McCrosky, column 9, lines 28-35 (this processing is done based on occupancy).

Regarding claim 21, the control entity determining that a data packet is suitable for transmission to a certain receiver when the data indicative of the degree of occupancy of the certain receiver indicates that the receiver is capable of accepting the data is disclosed in McCrosky, column 9, lines 28-35 (if the desired receiver is incapable of accepting the cell, the cell will be assigned a forward edge, queue position, or retrograde position).

Regarding claim 22, the control entity generating a plurality of control signals to request transmission of the data packet, each control signal being associated with a data packet, when the control entity determines that a group of data packets are suitable for transmission is disclosed in McCrosky, column 9, lines 28-35 (the control entity operates by generating signals that are associated with packets; packets that are suitable for transmission would have signals associated with them).

Regarding claim 23, the control entity including an arbiter for processing said control signals to select a data packet to transmit among the group of data packets suitable for transmission is disclosed in McCrosky, column 13, lines 15-18.

Regarding claim 24, each control signal conveying the priority level of the data packet associated with the control signal is disclosed in McCrosky, column 9, lines 28-35 (all processing is done based on priority, so the signals must contain that information).

Regarding claim 25, the arbiter selecting a data packet to transmit among the group of data packets suitable for transmission on a basis of the priority levels of the group of data packets suitable for transmission is disclosed in McCrosky, column 9, lines 28-35 (all transmitting is done based on priority).

Regarding claim 26, the arbiter processing control signals to request transmission of data packets in a round robin manner is disclosed in McCrosky, column 15, lines 50-53.

Regarding claim 27, the arbiter selecting a data packet to transmit among the group of data packets suitable for transmission on a basis of whether or not a data packet was previously submitted for transmission is disclosed in McCrosky, column 9, lines 36-37 (is a cell has been previously presented for transmission, and was not transmitted, it's priority will be bumped up, giving it a better chance of being transmitted next cycle).

Regarding claim 46, each cell further including a CPU connected to the plurality of receivers, wherein said control entity includes a first arbiter for processing said

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control signals to select a data packet to transmit to the I/O interface among the plurality of data packets suitable for transmission to the I/O interface, wherein said control entity includes a second arbiter for processing said control signals to select a data packet to transmit to the CPU among the plurality of data packets suitable for transmission to the CPU is disclosed in table 1, in column 7 (OAM cells may have additional control processing performed on them, or they may not).

6. Claims 38-39 are rejected under 35 U.S.C. 103(a) as being unpatentable over McCrosky in view of Kappler.

Regarding claim 38, the control entity being operative to alter the priority level associated with a given data packet of said plurality of data packets at least in part on a basis of a time of residence of the given data packet in said memory is not specifically disclosed in McCrosky. However, McCrosky does disclose in column 9, lines 36-37, that if a cell is not moved towards its ultimate goal during a cell exchange cycle, its priority will be boosted. Kappler further discloses in column 9, lines 49-53, increasing priority of cells as a function of time spent in the system. It would have been obvious to one skilled in the art at the time of the invention to alter the priority of packets based on time in residence in the memory. The motivation would be to ensure that a packet that has been forced to wait will thereafter move more quickly through the system.

Regarding claim 39, the control entity being operative to alter the priority level associated with the given data packet according to a function that relates the priority level of the given data packet to the time of residence of the data packet, that function selected in the group consisting of linear function, exponential function, and logarithmic

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function is missing from McCrosky. Kappler discloses in column 9, lines 45-47, incrementally increasing priority of cells as a function of time spent in the system. Using increments means that there is a linear relationship between priority and time. It would have been obvious to one skilled in the art at the time of the invention to increase priority linearly related to time. The motivation would be to use a simple type of function to relate priority and time.

7. Claims 40-41 are rejected under 35 U.S.C. 103(a) as being unpatentable over McCrosky.

Regarding claim 40, each data packet comprising a plurality of words including a first word of said data packet and a last word of said data packet wherein each word comprises a field indicative of whether said word is a pre-determined number of words away from said last word of said data packet is not specifically disclosed in McCrosky. However, McCrosky does disclose use of ATM cells, and converting packet traffic into ATM cells, in column 1, lines 15-21. An ATM cell is divided up into a header and payload (one may think of these as words) of a fixed length; the system knows how far whichever portion of the cell it is currently forwarding is from the end of the packet because of the fixed length of the cells. It would have been obvious to one skilled in the art at the time of the invention to have an indicator of how far from the end of the packet a particular portion of the packet is. The motivation would be to know how much time until the next packet should be transmitted.

Regarding claim 41, the transmitter being operative to monitor said field in each word of each data packet forwarded to at least one cell of said array, the transmitter



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further being operative to begin forwarding a next data packet currently being forwarded is indicative of whether said word is a pre-determined number of words away from said last word of said data packet is not specifically disclosed in McCrosky. However, McCrosky does disclose use of ATM cells, and converting packet traffic into ATM cells, in column 1, lines 15-21. An ATM cell is divided up into a header and payload (one may think of these as words) of a fixed length; the system knows how far whichever portion of the cell it is currently forwarding is from the end of the packet because of the fixed length of the cells. It would have been obvious to one skilled in the art at the time of the invention to start forwarding the next packet when a particular point in the previous packet has been reached. The motivation would be to promptly forward all packets as soon as the previous packet is done.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Cynthia L Davis whose telephone number is (571) 272-3117. The examiner can normally be reached on 8:30 to 6, Monday to Thursday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Huy Vu can be reached on (703) 272-3155. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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